



The Joint Improvised-Threat Defeat Organization will enable Department of Defense actions to counter improvised threats with tactical responsiveness and through anticipatory, rapid acquisition of Combatant Commands' efforts to prepare for, and adapt to, battlefield surprise in support of counter-terrorism, counter-insurgency, and other related mission areas including counter-improvised explosives.

# **Joint Improvised-Threat Defeat Organization's Counter-Unmanned Aerial System (C-UAS) Hard Kill Challenge**

## **1.0 Synopsis**

The threat of Unmanned Aerial Systems (UASs) to American interests within the Continental United States and outside our borders is an ongoing concern. The continued and rapid improvements to UAS technologies are not only increasing their availability, but also lowering their overall costs. Technological advancements have increased UAS's payload (payload weight divided by vehicle weight) and increased the level of ease to operate, fly, navigate and transport. These advances in technologies have not only increased opportunities to utilize UASs in many beneficial ways, but have also have increased the potential for hostile actors to utilize UASs in nefarious ways. The C-UAS Hard Kill Challenge will provide the Joint Improvised-Threat Defeat Organization (JIDO), United States Central Command (USCENTCOM), Program Directorate Counter-Rocket Artillery Mortar Missiles (PD C-RAM), DoD, other U.S. Government agencies and coalition partners an opportunity to review the current state of technology to defeat rotary and fixed wing UASs.

To assess current technology, the Joint Improvised Threat-Defeat Organization (JIDO), Defense Threat Reduction Agency (DTRA) is sponsoring a C-UAS Hard Kill Challenge at White Sands Missile Range, NM starting late February. Teams only need to be at the site for their portion. It is anticipated that teams will only have to be onsite for approximately 5 days. The C-UAS Hard Kill Challenge is focused on evaluating "Hard Kill" technologies that can defeat UASs with a flyswatter approach. For the purpose of this event, "hard kill" shall be defined as the physical interruption of a UAS's ability to maintain lift and continue its mission via the direct capture of the UAS, the physical destruction of the airframe and/or the permanent ability to disrupt the power to the airframe.

The focus of this Challenge is on technologies that can defeat a UAS beyond 250 meters (m). Participation is at the teams' own expense. During the Challenge, teams will have the opportunity to defeat a combined 30 rotor and fixed wing UASs in scored events and 4 additional UASs in non-scored events. For those teams that cannot afford to engage 34 UASs, JIDO will hold a demonstration phase where select teams can demonstrate their systems to the government stakeholders. Challenge prizes are for those teams who compete in the Challenge, not the demonstration.

Only a limited number of registrants will be selected to participate in the Challenge and demonstration. A panel of Subject Matters Experts (SMEs) will review each team package to determine the most qualified candidates. The number of participants is limited due to logistical concerns at the range, cost of targets, and range time.

## **JIDO HARD KILL CHALLENGE**

### **1.1 Key Dates**

18 Nov 16: Initial intent to enter Challenge to JIDO Points of Contact (POCs). JIDO will also need system specifications so that preliminary range safety reviews can begin.

02 Dec 16: Submission of completed registration package.

05 Dec 16: JIDO selection panel convenes to review submissions.

12 Dec 16: Notification of selected teams.

09-10 Jan 17: Team Participation Meeting (TBD)

20 Feb 17: Start of Challenge (team schedules will vary)

### **1.2 Awards**

Teams will compete for up to \$500,000 in prizes. Prizes will be given to the top performing team(s) subject to the availability and release ability of funds.

## **2.0 Registration Requirements**

### **2.1 Disclaimer**

This notice does not constitute a commitment by the U.S. Government. JIDO is not obligated to make prize as a result of any competitors' submission. JIDO is in no way liable to pay for or reimburse any company or entity that responds to this Challenge announcement. Submitting information for this Challenge announcement is voluntary. It is desirable that data be received with unlimited rights to the U.S. Government. However, it is recognized that proprietary data may be included with the information provided. If so, clearly mark all proprietary information as such.

The information provided will be used to assist determination of sources capable of countering small Unmanned Aerial Systems (UAS) ahead of an upcoming Challenge. The Challenge is a fixed event; therefore, no late submissions will be accepted.

### **2.2 Registration Requirements**

2.2.1 Interested parties should submit a white paper which should include the following information, if available. More information is better to allow more efficient range approvals and better inform the SMEs reviewing team submissions.

2.2.1.1 Business Name

2.2.1.2 Business Address

2.2.1.3 Business Webpage

2.2.1.4 CAGE Code

2.2.1.5 Company POC and Contact Information

2.2.1.6 Detailed System/Subsystem Description

2.2.1.7 System TRL Level and Justification

2.2.1.8 Brief Concept of Operations (CONOPS)

2.2.1.9 Operational View (OV-1) (optional)

2.2.1.10 Narrative of what it would take to be deployable and ready to use in an austere environment within 12 months.

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2.2.1.11 Program, Product or System Security Classification Guide or Guidance used to develop necessary security measures related to documentation, storage and operations and maintenance of the system and system data, in lieu of a classification guide, classification guidelines used to protect critical system parameters or critical information related to the program/product/system/technology must be provided.

2.2.1.12 Information Exchange Requirements (IERs/Interface Control Documents).

### 2.3 Document Submittal Instructions

All registration submittals must have arrived to JIDO close of business **2 December 2016**. Challenge invitee notifications will be made by **12 December 2016**. Submittals can be made either by mail, express mail or email via challenge.gov. The discussion board can be used for questions. The addresses are below:

#### Challenge.gov registration (preferred)

##### United States Postal Service (Classified and Unclassified)

ATTN: JIDO J8-AED/Hard Kill Challenge Team  
Defense Threat Reduction Agency  
8725 John J. Kingman Rd. Stop 6201  
Ft Belvoir, VA 22060-6201

##### Federal Express/United Parcel Service (Classified and Unclassified)

ATTN: JIDO J8-AED/Hard Kill Challenge Team  
Defense Threat Reduction Agency  
6200 Meade Rd  
Ft Belvoir, VA 22060-5204

## 3.0 Hard Kill Challenge Overview

The Hard Kill Challenge will provide JIDO and other DoD agencies an opportunity to evaluate where current technology is concerning hard killing rotor and fixed wing UASs. This Challenge will consist of three scored phases. The first phase is primarily set-up to verify the ability of each vendor's C-UAS system to hard kill a UAS. To advance to each subsequent phase, a vendor must hard kill a minimum of one (1) UAS in each phase.

Phase I is the initial C-UAS system assessment. The overall objective of this Phase is to determine if competitors' C-UAS systems can actually "hard kill" rotor and/or fixed wing UASs at known distances. During this Phase, all C-UAS systems (stationary & mobile systems) will remain stationary. Phase II will consist of a total of eight (8) test events where competitors will engage solo flying Group 1 rotor and fixed wing UASs with their C-UAS systems. Phase III will consist of a total of four (4) test events where competitors will engage multiple Group 1 rotor and fixed wing UASs with their C-UAS systems.

Details of each phase as well as diagrams are available to download from this announcement.

### 3.1 Phase I – Initial Assessment

Phase I is the initial C-UAS system assessment. The overall objective of this Phase is to determine if competitors' C-UAS systems can actually "hard kill" rotor and/or fixed wing UASs at known distances. During this Phase, all C-UAS systems (stationary & mobile systems) will remain stationary.

Each test event will consist of either a rotor UAS hovering between 50-100m above the ground or a fixed wing UAS flying in an oval pattern between 50-100m above the ground. The event will start at a stand-off

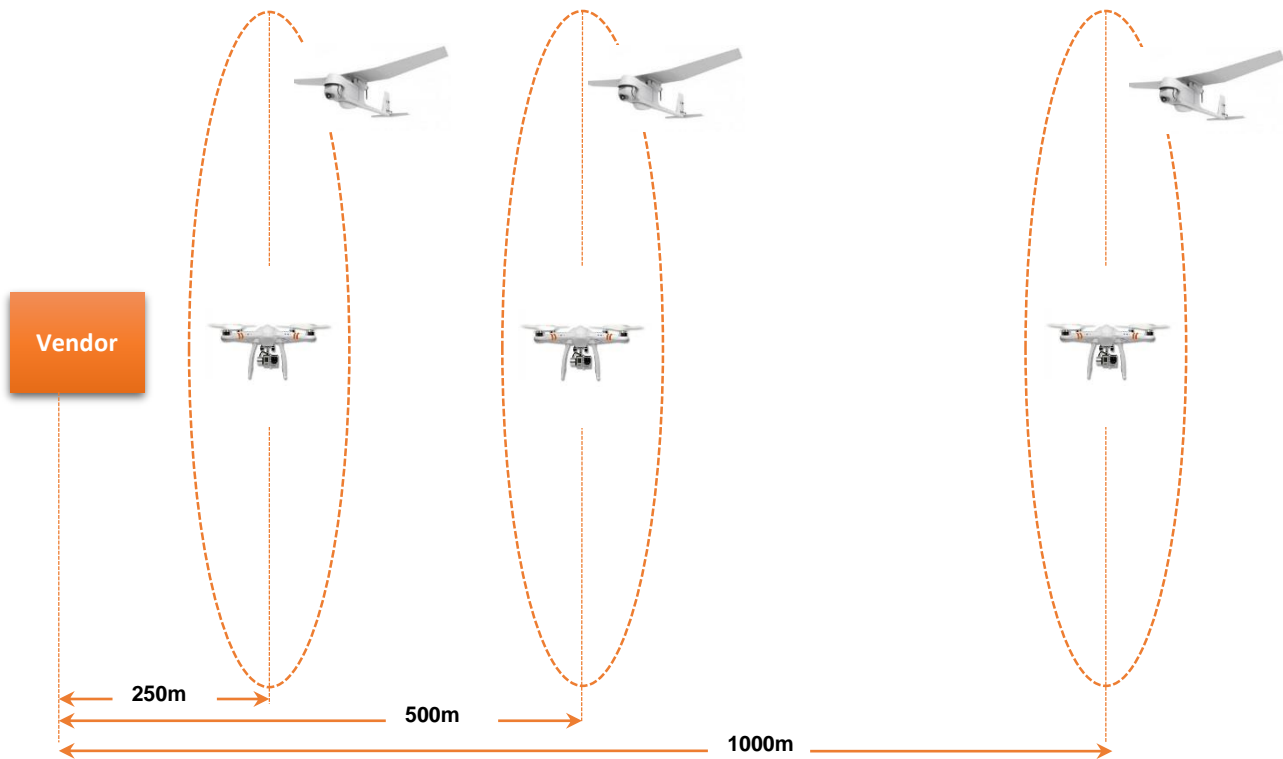
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distance of 250m. For each individual test event, the vendor will have 15 minutes to engage and defeat the UAS. The test manager will notify the vendor when the event clock has started. The clock will stop when the UAS touches the ground after being defeated. Rotor UASs will be engaged first. Once a vendor has defeated two (2) rotor UASs, the rotor portion of the test on at 250m is completed and fixed wing portion will commence. When the vendor has defeated two (2) fixed wing UASs the 250m test events are completed. If the competitors have not used up their six (6) rotor and six (6) fixed wing attempts at 250m, they will then engage UASs at 500m. This event is run exactly as the previous event at 250m. If competitors kill two (2) rotors and/or two (2) fixed wing UASs at 500m and still have at least 1 attempt remaining on a rotor or fixed wing UAS, then engagement the vendor will get an opportunity to engage rotor and/or fixed wing UASs at 1000m. The maximum score for this event is 700 points. **Table 1** provides the scoring matrix and **Figure 1** provides an illustration of the event. Competitors scoring 0 points during this Phase will not continue to Phases II and III. A no test will occur when a UAS malfunctions on its own.

**Table 1. Phase I Scoring Matrix**

Assessed	Time to Kill	Assessed Points		
		250m	500m	1000m
Kill	0 secs < > 59 secs	25	50	100
Kill	1 min < > 1 min, 59 secs	24	49	99
Kill	2 min < > 2 min, 59 secs	23	48	98
Kill	3 min < > 3 min, 59 secs	22	47	97
Kill	4 min < > 4 min, 59 secs	21	46	96
Kill	5 min < > 5 min, 59 secs	20	45	95
Kill	6 min < > 6 min, 59 secs	19	44	94
Kill	7 min < > 7 min, 59 secs	18	43	93
Kill	8 min < > 8 min, 59 secs	17	42	92
Kill	9 min < > 9 min, 59 secs	16	41	91
Kill	10 min < > 10 min, 59 secs	15	40	90
Kill	11 min < > 11 min, 59 secs	14	39	89
Kill	12 min < > 12 min, 59 secs	13	38	88
Kill	13 min < > 13 min, 59 secs	12	37	87
Kill	14 min < > 15 mins	11	36	86
Hit, No Kill		0	0 pts	0 pts
Miss		0	0 pts	0 pts

## JIDO HARD KILL CHALLENGE



**Figure 1. Phase I Diagram**

At the completion of the scored portion of this event, there will be a non-scored special test event where countermeasures will be applied to the rotor and fixed wing UASs. Competitors who have scored at least 11 points will have the opportunity to kill two (2) modified rotor and two (2) modified fixed wing UASs from the system's maximum Phase I kill range (250m, 500m or 1000m).

### **3.2 Phase II – Single UAS Missions (Rotor & Fixed Wing UASs)**

Phase II will consist of a total of eight (8) test events where competitors will engage Group 1 rotor and fixed wing UASs with their C-UAS systems.

There will be a total of four (4) solo rotor missions and four (4) solo fixed wing missions. The flight pattern for each of these missions will be different, but the objective will remain the same. All competitors will be given the same missions, in the same order (easiest to hardest). Each test event ends when the UAS is either killed or flies into the objective area. Competitors can earn up to 1,600 points for this Phase (200 pts./event).

**Table 2** provides the scoring matrix and **Figure 2** provides an illustration of the event.

**Table 2. Phase II Scoring Matrix**

Kill Distance	Points
>2750m	200
2500m - 2750m	175
2000m - 2499m	150
1500m - 1999m	125
1000m - 1499m	100
750m - 999m	75

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Kill Distance	Points
500m - 749m	50
250m - 499m	30
100m-249m	25
Assessed Hit	0
Miss	0

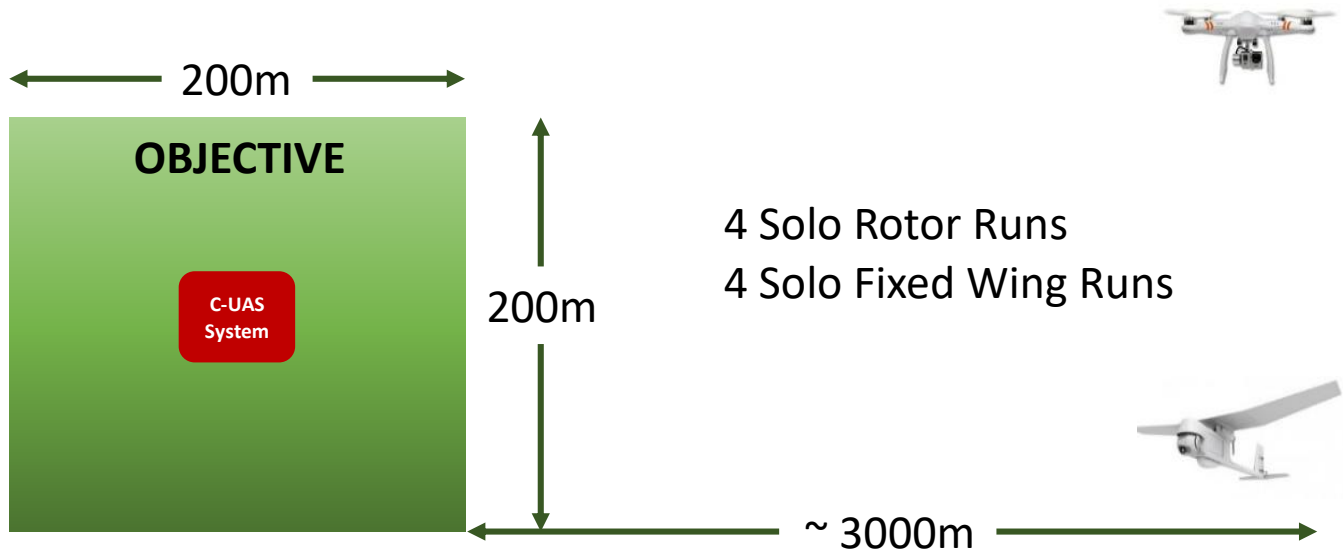


Figure 2. Phase II Diagram

### 3.3 Phase III – Swarm UAS Missions (Rotor & Fixed Wing UASs)

Phase III will consist of a total of four (4) test events where competitors will engage Group 1 rotor and fixed wing UASs with their C-UAS systems.

All four (4) test events consist of missions with multiple UASs. The first two events will have two (2) UASs (1 rotor and 1 fixed wing). The third test event will consist of three (3) UASs (2 rotors and 1 fixed wing). The final test event will consist of 3 UASs (2 fixed wing and 1 rotor). All competitors will be given the same missions, in the same order (easiest to hardest). Each test event ends when each UAS is either killed or flies into the objective area. Competitors can earn up to 2,000 points for this Phase (maximum 400-600 pts./event). **Table 3** provides the scoring matrix and **Figure 3** provides an illustration of the event.

Table 3. Phase III Scoring Matrix

Kill Distance	Each Kill
>2750m	200
2500m - 2750m	175
2000m - 2499m	150
1500m - 1999m	125

## JIDO HARD KILL CHALLENGE

Kill Distance	Each Kill
1000m - 1499m	100
750m - 999m	75
500m - 749m	50
250m - 499m	30
100m-249m	25
Assessed Hit	0
Miss	0

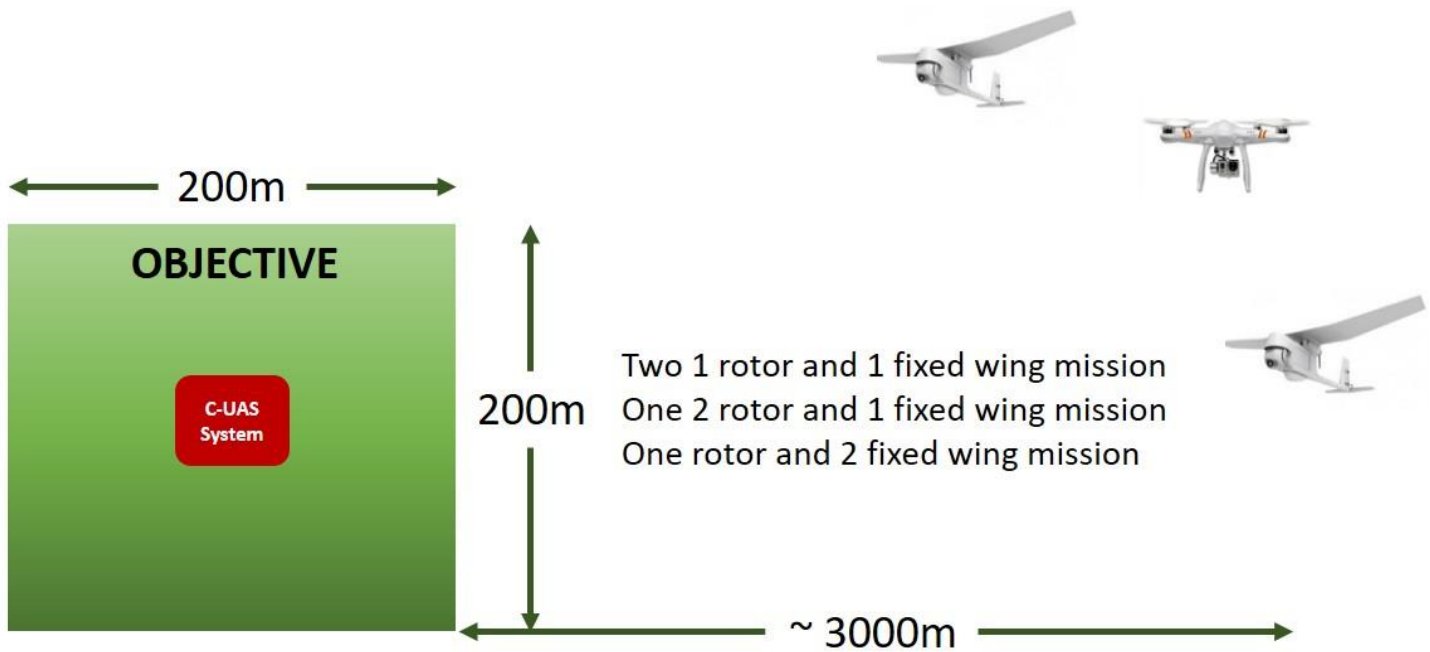


Figure 3. Phase III Diagram